STATOIL

Report

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FINAL WELL REPORT 30/3-A-14(005) - 30/3-5S **RESERVOIR / GEOLOGY**			
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1 INTRODUCTION

The main objective of well 30/3-5 was to explore possible hydrocarbons in the Brent Group sandstones in the G-prospect, just east of the Veslefrikk field, and to utilize the well as a producer if sufficient amount of hydrocarbons were discovered. The well also provided useful geologic information from the Brent Gr. and Intra Dunlin Sandstone to refine the geological models in the Veslefrikk area.

1.1 Objectives

This report covers the interpretation of the following three tests.:

Test no.	Date of operation	Comments
1	16.07.92 - 28.07.92	Productiontest in IDS
2	18.08.92 - 21.08.92	Productiontest in the Brent Group
3	07.10.92 - 10.12.92	Production test in the Etive fm

The interpretation of the tests are performed on Statoil's inhouse interpretation system Testsys.

Test objectives, test no. 1 in Intra Dunlin Sand

- Perforate the IDS on wireline with 90 bar underbalance
- Acquire data for determination of reservoir parameters and geometry in the IDS.
- Perform bottom hole PVT sampling

Test objectives, test no. 2 in Oseberg B3 and B2C

- Perforate the Oseberg formation on wireline with 40 bar underbalance
- Acquire data for determination of reservoir parameters and geometry in the Oseberg fm.
- Perform bottom hole PVT sampling.

Test objectives, test no. 3 in Etive B5

- Perforate the Etive formation on wireline with 40 bar underbalance
- Acquire data for determination of reservoir parameters and geometry in the Etive fm.
- Identify the reservoir pressure and pressure support in the Etive fm.

1.2 Main Results from Logging and Testing

Well characterization:

- The IDS 3 reservoir is very thin, and has a very poor reservoir quality.
- The Oseberg fm. is considerably less carbonate cemented than within the surrounding area.
- The Etive fm. was approx. 8400 kPa depleted, the Oseberg fm. was approx. 1700 kPa depleted, and IDS was not depleted.

Results from the three tests:

- Main results from test no. 1, IDS tested separately

Permeability :	0.0007 μm^2
Total Skin S_t:	-1
PI:	approx. 0.2 $Sm^3/d/bar$
Reservoir pressure @ 3000 m TVD MSL:	324.6 bar

The well died due to liquid load up during the test.

- Main results from test no. 2, Oseberg tested separately

Permeability:	0.062 μm^2
Total Skin S_t:	-0.63
PI:	11.9 $Sm^3/d/bar$
Reservoir pressure @ 2800 m TVD MSL:	294.9 bar

The well was shut inn due to low wellhead pressure

- Main results from test no. 3, Etive tested separately

Permeability:	0.66 μm^2
Total Skin S_t:	6.5
PI:	43.6 $Sm^3/d/bar$
Reservoir Pressure @ 2800 m TVD MSL:	247.7 bar

For details concerning test analysis, se chapter 5.

2 WELL INFORMATION

2.1 Well History

The well was drilled as an exploration well i the G-prospect in the period 28.04.92 - 20.06.92. A total of five cores were cut, the four first were cut in the Brent group, and the fifth core was cut in the IDS. Open hole logging and formation pressure measurements were carried out 15-18.06.93 on wireline. During completion a permanent pressure gauge was installed in the well, but it failed before the well was perforated.

The IDS formation was perforated 13.-18.07.93 on wireline and cleaned up over the burnerboom. The well was then flowed to the testseparator. Due to low productivity in the IDS, the well died as a result of liquid load up.

In the period 16.-21.08.93 a plug was set above the perforations in IDS, and the well was perforated and tested in the Oseberg fm. The well was produced until 06.11.92 when it was shut in due to low wellhead pressure.

In the period 7.-10.12.92 a retrievable bridge plug was set above the perforations in the Oseberg fm., and three intervals in the Etive fm. was perforated and memory pressure gauges were placed in the well for downhole recording of pressure and temperature, and retrieved 25.01.93. The retrievable bridge plug was pulled 29.01.92, but it was found approximately 105 m. deeper than it was set. The pressure data indicates that the plug collapsed 15.12.92.

On 10.04.93 the well was started up with gas lift after having been shut down for about one month due to low wellhead pressure.

2.2 Well and Completion Data

Table no. 2.1

WELL Well type Slot	30/3-A14 Exploration well in the G-prospect 6
Start of drilling Drilling terminated	28.04.92 20.06.92
Re-entry guide above the Ness fm. (B6E) Re-entry guide in the Ness fm. (B6E) Re-entry guide in the Rannoch fm. Re-entry guide above the IDS fm. Bottom of permanent pressure gauge Radioactive marker in 7" liner Radioactive marker in 7" liner Radioactive marker in 7" liner Top of cement plug Reference log for depth correlation Cement bond log in 7" liner	3631 m MD RKB 4108 m MD RKB 4153 m MD RKB 4280 m MD RKB 3575 m MD RKB (2564.5 m TVD MSL) (pressure gauge failed during completion) 3615 m MD RKB 3838 m MD RKB 4213.5 m MD RKB DITE/BHC/LDT/CNT/GR run 2A (15.06.92) CBL/VDL/GR run 3A (23.06.92)
Minimum ID in the completion Deviation in the perforation interval Height drill floor to MSL Volume of tubing from wellhead to bottom of perforation interval	3.687"(93.6 mm) at 4267 m MD RKB 49° 57.2 m 48 m^3

2.3 Perforation Data

Table 2.2, perforation data

ZONE	INTERVAL (m MD RKB)	INTERVAL (m TVD RKB)	SHOT DENSITY (shot/m)
IDS (plugged back)	4424.0 - 4436.0	3131.9 - 3139.8	20, DPC [1]
Oseberg B3	4155.0 - 4161.0	2958.0 - 2962.0	20, DCP [2]
Oseberg B2C	4163.0 - 4188.0	2963.3 - 2979.7	20, DCP [2]
Etive B5C	4128.0 - 4131.0		20, DCP [3]
Etive B5B	4134.0 - 4136.0		20, DCP [3]
Etive B5A	4139.0 - 4142.0		20, DCP [3]

1) Perforated 16.07.92 on wireline

2) Perforated 18.08.92 on wireline

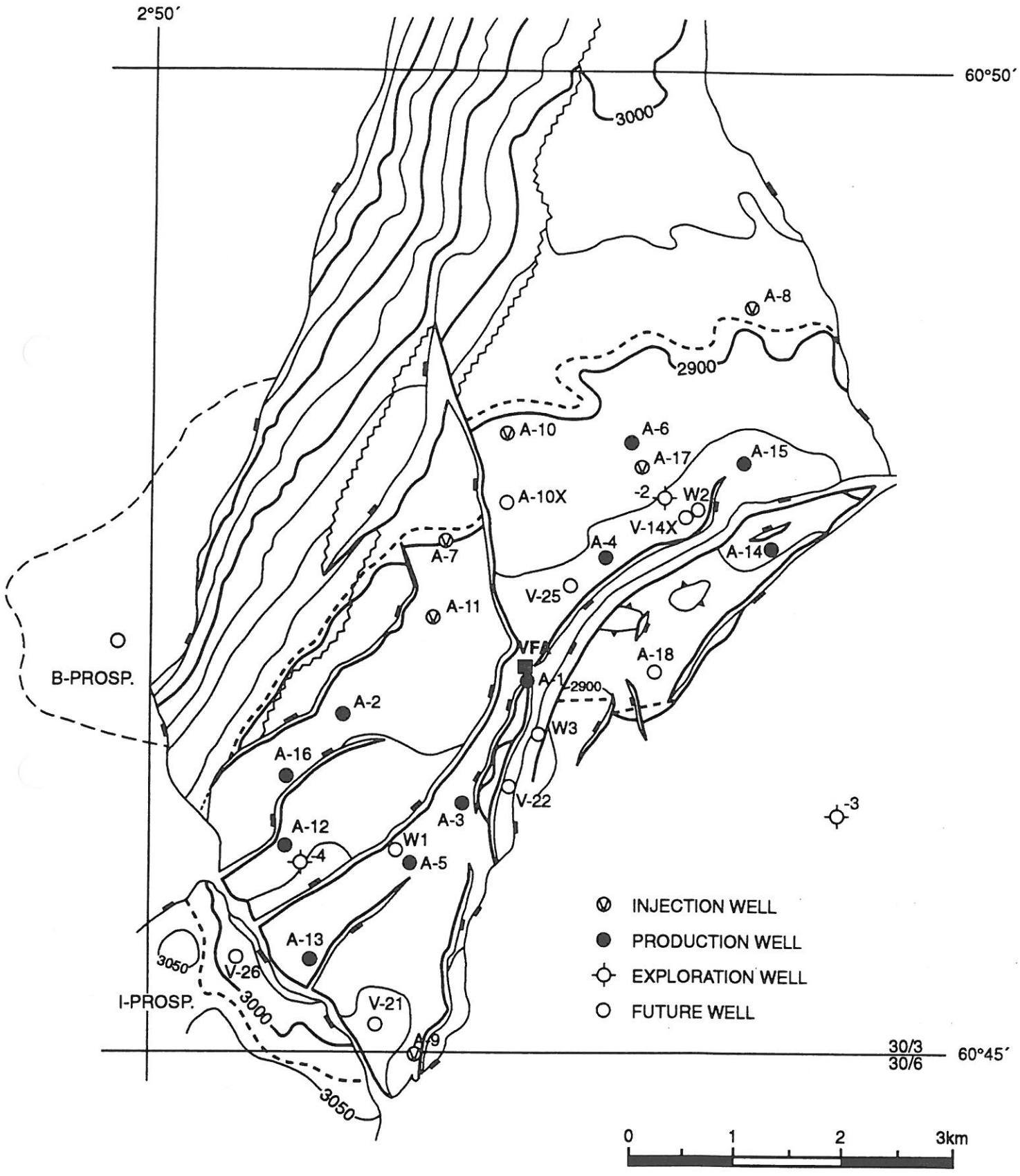
3) Perforated 09.12.92 on wireline

Reported depths according to depth reference LDT/CNT/GR, run 2A, June 15th. 1992

Guns used: Schlumberger 3 3/8" OD, 6 spf, 60° phasing, 22 g DP charges.

Well location as per figure no. 2.1.
Completion configuration as per figure 2.2

VESLEFRIKK FIELD
WELL LOCATIONS



MAC/VFR/0018A/150993/5

COMPLETION CONFIGURATION

WELL No. : 30/3-A-14

COMPLETION No.: FINAL

DATE: 22.06.93

	mRKB MD	mRKB TVD
TOTAL DEPTH PBTD	4485	3234

DEPTH, BOTTOM ITEM mRKB MD	mRKB TVD	O.D. INCHES	I.D. INCHES	DEVIATION DEGREES	DESCRIPTION	REF. No.
29	29				Tubing Hanger Shoulder (Tubing Head) GRAY 5 1/2" 20#,BDS Tubing Hanger	
		6.050	4.892		5 1/2",17#,BDS,13%Cr-80 Tubing	
331	331	8.000	4.562	2	CAMCO 5 1/2" 9SH-4-RO Comm. nipple	HPN-1402
					5 1/2",17#,BDS,13%Cr-80 Tubing 1joint	
349	349	8.000	4.437		CAMCO 5 1/2" TRDP-5 STAT-RO TRSCSSV	HGS-403
		6.050	4.892		5 1/2",17#,BDS,13%Cr-80 Tubing 1joint	
366	366	8.125	4.625		BAKER 5 1/2" "AVLDM" Annulus Safety Valve	
373	373	8.250	4.370		BAKER "FLX" Pack-off tubing hanger	
375	375	7.625	4.312	4	BAKER 5 1/2",20#,Sin. Comm.Sleeve nipple	
		6.050	4.892		5 1/2",17#,BDS,13%Cr-80 Tubing	
1050	918	6.050	4.892		5 1/2",17#,BDS,13%Cr-80 Tubing	
2083	1827	7.862	4.735	47	CAMCO 5 1/2" MMG-RD-1P-LS SPM w/DUMP VALVE (BAKER C-CONTROL VALVE)	BBM-180
		6.050	4.892		5 1/2",17#,BDS,13%Cr-80 Tubing	
2444					9 5/8" liq back packer	
2536	1948	7.862	4.735	49	CAMCO 5 1/2" MMG-RD-1P-LS SPM	BBM-164 SPL-104 SSD-113
		6.050	4.892		5 1/2",17#,BDS,13%Cr-80 Tubing	
2845	2148	7.862	4.735	51	CAMCO 5 1/2" MMG-RD-1P-LS SPM	BBM-170 SPL-100 SSD-118
		6.050	4.892		5 1/2",17#,BDS,13%Cr-80 Tubing	
3181	2347	7.862	4.735	49	CAMCO 5 1/2" MMG-RD-1P-LS SPM	BBM-171 SPL-103 SSD-117
		6.050	4.892		5 1/2",17#,BDS,13%Cr-80 Tubing	
3471	2551	3470	2550	48	CAMCO 5 1/2" MMG-RD-1P-LS SPM	BBM-173 SPL-102 SSD-121
3508	2578	7.500	4.853	48	5 1/2" MARC Incl. Gauge carrier	PDG-003-02
		6.050	4.892		5 1/2",17#,BDS,13%Cr-80 Tubing 1joint	
3581	2634	8.250	4.500	48	CAMCO 5 1/2" x 20' OP Expansion Joint	BOE-187
		6.050	4.892		5 1/2", 17# BDS, 13%Cr-80 1 stk.	
3597	2634				BAKER "B-22" Adapter.	
3599	2638			48	BAKER "SAB-1" Prod. Packer	
3609					BAKER 6 5/8" Millout Extension	
					X-over 6 5/8" x 5 1/2"	
3612					1 tubing joint 5 1/2" S.C.	
					Pup joint S.C.	
3617	2658			48	Baker "O" Tbg sp-co packing Nipple, dia 4.125	
3638	2649				5 1/2" Pup Joint, PERFORATED S.C.	
3650	2658				1 ft. 5 1/2" Tubing S.C.	
4.161	2978	5.887	4.000	48	Baker WL Re-entry guide	
		5.000	4.548		Baker "FA-1" Prod. Packer 5 1/2" 17# Millout extension	
					X-over 5 1/2" x 5"	
		5.000	4.000		5 1/2" 15# BDS PUP JOINT	
4.163	3013	5.886	4.276		5 1/2" 15# BDS Mule shoe	
4181					Top perforation	
			4.184		7" Liner 26#,BDS,13%Cr-80	
4183					Bottom perforation	
4191	3021	5.887	4.000	48	Baker "FA-1" Prod. packer	
		5.000	4.548		5 1/2" 17# Millout extension	
		5.000	4.276		5 1/2" 15# BDS PUP JOINT	
4193	3023	5.886	4.276	48	5 1/2" 15# BDS Mule shoe	
4195	3024.1				Top perforation	
4197					Bottom perforation	
4203					Top perforation	
4208					Bottom perforation	
4209	3030	5.887	4.788	50	BAKER "FA-1" Prod. packer	
		5.960	4.892		5 1/2" 17# Millout extension	
		5.000	4.892		5 1/2" 17# x 4 1/2" 12.6# X-over	
		5.250	3.958		4 1/2" 12.6# Pup joint	
4259	3050	5.370	3.887		CAMCO 4 1/2" RN-8 Landing Nipple	
		5.250	3.958		4 1/2" 12.6# Pup Joint	
					4 1/2" 12.6# VAM,13%Cr-80 Tubing 1 ft	
4272	3060	5.250	3.958		4 1/2" 12.6# Re entry guide	
4424	3187.8				Top perforation	
4430					Bottom perforation	
4485	3234			50	PBTD	

BRONN 30/3-A-14

5

Fig 2.2

3 PETROPHYSICAL EVALUATION AND GEOLOGY

3.1 Geology

Exploration (production) well 30/3-5S (A-14). As expected a fully developed Brent Group is present in the well. With exception of the Amundsen/Burton fm. which came in 3,5m shallower than prognosed, the formation tops came in slightly deeper than prognosed (from only 1m, IDS, to 12,5m, Etive fm.). The thickness of the formations are close to the prognosis with a maximum difference for the Drake fm. which is 6m thinner than prognosed. As expected the B6E subunit is present and fully developed in the well. The presence of the B6E sandstones confirm the assumed south/north directional trend for the river channel fills which are present in the easternmost part of the field. The Oseberg fm. is considerably less carbonate cemented than within the surrounding area. Only a few thin, scattered cemented intervals are present in the well.

The IDS3 reservoir sandstone came in almost exactly as anticipated. This strongly indicates, as feared, that the IDS3 in general is very thin and has a very poor reservoir potential in the G-area and the easternmost part of the D-area. The main fault separating the D-area and the G-area, was encountered close to the top of the Statfjord fm. in the D-area. Knowing that the Amundsen/Burton fm. has a relatively uniform thickness all over the field, this will give a fault throw in the order of 70 to 80m which is also in a good accordance with the structural depth map. However, the fault was encountered 80m further to south-east than it is placed on the top Statfjord fm. structural depth map. The OWC within the Statfjord fm. in the D-area, is situated at 3209.5m TVD MSL in the well. This implies that all the depths in the 8 1/2" section have to be adjusted up by 1,5m (CSSD) to match the expected common OWC at 3208m TVD MSL for the Statfjord fm. within the D-area.

A total of five cores were cut. The first four were cut in the Brent Gr., from 9m MD below the top Ness Fm. to 4m MD into the B1B subunit. The fifth core was cut in the IDS, from the top of the IDS3A to about 6m MD into IDS2, implying that nothing of the reservoir sandstone was cored. The recovery was good for all the cores, from 95-100%. The preliminary oil in place (STOOIP) resources within the Brent group. in G-area, have been calculated to 5.4 x 10^6 Sm^3. An OWC of 2955m TVD MSL was used for the B7 unit and the B6E subunit, while an OWC of 2993m TVD MSL was applied for the remainder reservoir units/subunits within the Brent group.

3.2 Reservoir zonation

Table no. 3.1, reservoir zonation well 30/3-A-14

Formation/ Group	Progn TVD MSL	Results TVD MSL	+/-	Progn thickness	Results thickness
Top Viking	2697.0	2706.0	+9.0	183.0	182.0
Top Tarbert	2880.0	2888.0	+8.0	5.0	6.5
Top Ness	2885.0	2894.5	+9.5	42.0	45.0
Top Etive	2927.0	2939.5	+12.5	12.0	10.0
Top Rannoch	2939.0	2949.5	+10.5	10.0	9.0
Top Oseberg	2949.0	2958.5	+9.5	59.0	56.5
Top Dunlin	3008.0	3015.0	+7.0	123.0	117.0
Top IDS	3131.0	3132.0	+1.0	50.0	45.5
Top A/B	3181.0	3177.5	-3.5	100.0	
Top Statfjord	-	3205.0[1)]	-		
Total Depth		3287.0			

All depths are not corrected. Necessary depth correction (CSSD): -1.5 m.

[2)] Top Statfjord Fm. in the D-area.

4 Formation Pressure Measurements

Formation pressure measurements in well 30/3-5 were performed 15 June 1992 in open hole utilizing the Schlumberger RFT tool (Repeat formation tester) with HP gauge on wireline.

A total of 24 RFT pressure measurements were collected, and 17 of these were good.

Table 4.1 - Formation pressure from RFT, logged 15.06.92

Test no.	Formation	Depth (m MD RKB)	Depth (m TVD MSL)	Formation Pressure (kPa)	Comments
1	Tarbert	4053.3	2892.3		Dry
2	Tarbert	4054.5	2893.2	32706	OK
3	N-B6E	4063.0	2899.0		Dry
4	N-B6E	4062.3	2898.5		Leakage
5		4078.5	2909.4	32743	OK
6		4088.0	2915.8	32809	OK
7	N-B6E	4123.0	2939.1	29865	OK
8	Etive	4129.0	2943.1	24683	OK
9	Etive	4133.5	2946.1	24671	OK
10	Etive	4141.0	2951.0	24730	OK
11	Ranoch	4148.0	2955.6		Dry
12	Oseberg B3	4156.0	2960.9		Dry
13	Oseberg B3	4157.2	2961.7	31933	OK
14	Oseberg B2	4168.0	2968.8	31677	OK
15	Oseberg B2	4180.0	2976.6	31732	OK
16	Oseberg B2	4187.0	2981.2	31760	OK
17	Oseberg B2	4201.0	2990.2	31694	OK
18	Oseberg B2	4212.0	2997.4		Dry
19	Oseberg B2	4213.0	2998.0		Dry
20	Oseberg B2	4221.5	3003.4	31849	OK
21	Oseberg B1	4230.3	3009.0	33400	OK
22	IDS-3B	4426.0	3135.3	35462	OK
23	IDS3B	4431.0	3138.6	35496	OK
24	IDS2	4438.0	3143.2	35892	*

* Formation pressure not stabilized

Table 4.2 - Reservoir pressure depletion (logged 15.06.92)

Formation	Depth (m MD RKB)	Depth (m TVD MSL)	Reservoir pressure, 15.06.92 (kPa)	Initial Reservoir Pressure (kPa)	Depletion (kPa)
Tarbert	4054.5	2893.2	32706	33490	784
	4078.5	2909.4	32743	33644	901
	4088.0	2915.8	32809	33705	896
N-B6E	4123.0	2939.1	29865	33928	4063
Etive	4129.0	2943.1	24683	33175	8492
Etive	4133.5	2946.1	24671	33203	8532
Etive	4141.0	2951.0	24730	33250	8520
Oseberg B3	4157.2	2961.7	31933	33352	1419
Oseberg B2	4168.0	2968.8	31677	33419	1742
Oseberg B2	4180.0	2976.6	31732	33493	1761
Oseberg B2	4187.0	2981.2	31760	33537	1777
Oseberg B2	4201.0	2990.2	31694	33622	1928
Oseberg B2	4221.5	3003.4	31849	33748	1899
Oseberg B1	4230.3	3009.0	33400	33801	401
IDS-3B	4426.0	3135.3	35462	35747	285
IDS3B	4431.0	3138.6	35496	35781	295
IDS2	4438.0	3143.2	35892	35892	-65

The formation pressure measurements performed in the exploration wells and in the predrilled wells, giving the initial reservoir pressure, are reported in the Statoil report "A review of Veslefrikk RFT data trough well 30/3-A-6, February 1989".

5 Production Testing

5.1 Completion Data

An overview of the A-14 well completion details presented in Fig. 2.2, and additional useful information concerning the drilling and completion phase is previously distributed as per ref. [1]

5.2 Test no. 1 - Production test in IDS

5.2.1 Sequence of events

On the 16.07.92 the well was perforated in IDS in three runs on wireline. The perforation was performed against open choke. After the perforation guns were out of the hole, the well was backflowed to the burnerboom for clean up for a period of 19 hours, followed by a wireline run to place memory gauges in the well.
The well was opened for production on 17.07 at 1845. The shut-in wellhead pressure (SIWHP) was 70.2 bar, and the flowing wellhead pressure (FWHP) dropped rapidly as the well was opened. On the 18.07 at 0930 the well was shut in, due to low wellhead pressure. The FWHP had declined to 14.3 bar. The well was shut in until 22.07.92 when a second flow period was started. This flowperiod lasted for 23 hours. The well was shut in until 28.07.92, when the gauges were retrieved.

5.2.2 Pressure data for analysis

The bottom hole pressure and temperature monitoring was performed with 3 ELS LMR-1000 memory gauges placed at 4268 m MD RKB. The gauges performed satisfactory. Fig. 5.1 shows bottomhole pressure during the test period. PVT data used in the analysis is shown in fig. 5.2. Pressure recorder 9111Q with the sensor point at 4270.1 m MD RKB (3042.4 m TVD MSL) is used for analysis. The choice of gauge was arbitrary.

The official reference depth for the IDS fm. is 3000 m TVD MSL, initial reservoir pressure P_{ires} = 34657 kPa. A gradient of 6.76 kPa/m should be applied for calculation purposes.

5.2.3 Pressure buildup

Flow and shut-in period no. 2 is used for the analysis. Test performance, synthetic pressure and rate history is shown in fig. 5.3. The plot shows good match between the test data, and the synthetic generated data. The semi-log plot in fig. 5.4 shows that the testdata is of good quality for the shut-in period. Determination of rates from the testseparator for use in the analysis is difficult due to slugging and unstable oilflow during the flowperiod. As a consequence of the low productivity, pseudo-steady flow was not reached, and as shown in

fig 5.3 the simulated pressure during flowing period does not correspond with the measured pressure for the same periods. This indicates that the flowrates measured at the testseparator, and used in the analysis, not are correct. This leads to uncertanties in the analysis.

Fig. 5.5 shows the Horner analysis. The shape of the curve indicates a no-flow boundary approximately 11 m from the well.
Fig. 5.6 shows a type curve analysis plot.
The analysis gives the following results for the IDS formation:

Table 5.1- Main results from the IDS test:

Net sand thickness used:	7.90 m
KH-product	0.005219 μm^2 m
Permeability:	0.00066 μm^2
Reservoir pressure @ 3000 m TVD MSL:	324.6 bar
Total Skin S_t:	-1

A no-flow boundary seems to be situated approximately 11 meters from the well.
PI is calculated using the following formula:

$$PI = \frac{Q_{tot}}{P_{res} - P_{wf}}$$

PI is calculated to ~ 0.2 Sm^3/d/bar using rate and pressure data from the final flowperiod.

The test was terminated due to low productivity, and severe difficulties measuring the flowrate due to unstable flow. Based on these results, the zone was decleared non-productive.

5.3 Test no. 2 - Production test in Oseberg

5.3.1 Sequence of events

On 16.08.92 an isolation plug was placed between IDS and Oseberg, to isolate the perforations in IDS. On 17.08.92 two intervals in Oseberg was perforated with 41 bar underbalance. The well was produced for 21 minutes to the testseparator for initial clean up. On 18.08.92 one more interval in Oseberg was perforated, and the well was flowed for 25 min. to the testseparator. After the guns were pulled out, the well was flowed 5 hours to the testseparator for cleanup. The rate was increased in steps to a maximum flowrate of 1000 Sm^3/d. Following the cleanup, pressure and temperature gauges were run in the hole on wireline. One of the gauges had surface readout, and two were memory gauges. The well was flowed for 17 hours, followed by a 22.5 hour buildup period.

5.3.2 Pressure data for analysis

The bottom hole pressure and temperature monitoring was performed with 1 Panex 1420B gauge with surface readout, and two LMR 1000 memory gauges. The bottom of the tool string was placed at 4184 m MD RKB. One of the LMR 1000 gauges gave data that did not correspond with the two other gauges.
The pressure data is shown in fig. 5.7. Fig. 5.8 shows the PVT data used in the analysis.
The Panex recorder with the sensor point at 4182.0 m MD RKB (2988.8 m TVD MSL) was used for analysis.
The official reference depth for the Brent fm. is 2800 m TVD MSL. A gradient of 6.42 kPa/m should be applied for calculation purposes.

5.3.3 Pressure Buildup

During the flowperiod before the buildup, flowrate decreased from 1039 Sm^3/d to 948 Sm^3/d during the 17 hour flowperiod. Fig. 5.9 shows synthetic generated pressure data. The reservoir model used indicates a no-flow boundary situated approximately 70 m from the well. Fig. 5.10 and 5.11 shows two multirate Horner plots for the build up period. The shape of the curve indicates a no-flow boundary at the end of the buildup period. Synthetic data gives a distance of 70 m to the boundary. Figs. 5.12 and 5.13 shows measured and simulated pressure plotted on semi-log and log-log scale, using reservoir parameters and reservoir shape of a no-flow boundary 70 m from the well. Both curves show good match.

Table 5.2 - Main results from the Oseberg test:

Net sand thickness used:	14.5 m
KH-product:	0.8942 μm^2 m
Permeability:	0.0615 μm^2
Reservoir Pressure @ 2800 m TVD MSL	294.9 bar
Total Skin S_t:	- 0.63

Productivity index, PI, estimated using data from the end of the flow period:

$$PI = \frac{q_o}{P_{res} - P_{wf}} = \frac{950}{307.0 - 227.6} = 11.9 Sm^3/D/bar$$

5.4 Test no. 3 - Production test in Etive

5.4.1 Sequence of events

On 07.12.92 a Baker inflatable plug was placed at 4150.7 m MDRKB to isolate the perforations in Oseberg. After the plug was set Etive was perforated in three intervals on wireline, followed by a 3 hour cleanup flow over the burner boom. Then three Schlumberger pressure and temperature gauges were placed at 3617 m MD RKB.
On 10.12.92 the flowperiod started, and the well was flowed for 11.5 hours, followed by a 22.5 hour shut-in period. After the shut-in period the well was put on regular production. The pressure and temperature gauges were retrieved on 25.01.93. The Baker inflatable plug was retrieved on 29.01.93. The plug was located at 4257 m MDRKB. *Pressure data indicates that the plug collapsed on 15.12.93.*

5.4.2 Pressure data for analysis

Bottom hole pressure and temperature monitoring was performed using three Schlumberger memory CRG gauges placed at 3617 m MD RKB.
Fig. 5.14 shows a plot of the bottomhole pressure during the 30 day testperiod. Pressure data used for analysis is showed in fig. 5.14, and PVT data used in the analysis is showed in fig. 5.15.
Gauge SDP2 with the sensorpoint at 3622.5 m MD RKB (2596.0 m TVD MSL) was used in the analysis. This gauge gave the best data for analysis.

5.4.3 Pressure buildup

The buildup data from the shut in period on 11.12.92 is used in the analysis. Reservoir parameters are calculated using Horner analysis. The Horner plot is shown in figs. 5.16, and 5.17.
Fig. 5.18 shows synthetically generated data for the test period, and the flow period after shut in, and before the plug between Oseberg and Etive collapsed. The reservoir model used in the simulation is two intersecting no-flow boundaries with a 30° intersecting angle, and the boundaries 380 m and 60 m from the well. The shape of the chosen reservoir geometry is as given by the geological maps but the distance to the faults does not correspond with the distances shown on the maps. This reservoir model however does not give a good match for synthetic generated sem-log and log-log curves shown in fig 5.19 and 5.20. These are matched with one no-flow boundary 365 m from the well. This may indicate that one of the two boundaries shown at the geological map is not a no flow boundary, and that the G-area communicates with the main field.

The analysis gives the following reservoir parameters for Etive:

Net sand thickness used:	9.9 m
kh product:	6.49 μm^2 m
Permeability:	0.66 μm^2
Reservoir Pressure @ 2800 m TVD MSL	240.7 bar
Total Skin S_t:	6.5

PI is estimated to 43,6 $Sm^3/d/bar$.

The well has a 49° deviation in the perforated interval, and is partly penetrated in the productive zone. Skin due to deviation and partial penetration is calculated to 0.7. This gives a damage skin $S_d = 5.8$